Public Water Supply
Source Water Assessment
For

# Blades Water

## PWS ID: **DE0000865**

Sussex County, Delaware

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## Introduction

In 1974, the United States Congress passed the Safe Drinking Water Act (SWDA). This Act is to protect public health by regulating the nation's public drinking water supply (EPA, 1974). Amendments to the SDWA passed in 1996 required each State to complete a Source Water Assessment for each public drinking water system (EPA, 1997). The United States Environmental Protection Agency (EPA) approved Delaware's Source Water Assessment Plan in October 1999.

The Delaware's Citizens Technical Advisory Committee (CTAC) developed the Delaware's Source Water Assessment Plan (SWAP). The committee is composed of scientists, water industry professionals, conservation groups, government agencies, and interested citizens.

The EPA mandates that an Assessment be available to the public. The purpose of this document is to provide information to help drinking-water system operators identify the potential threats to their drinking water supply and work to protect these drinking water sources.

The Assessment includes four maps:

1. The Base Map shows the location of the system and each well.
2. The Delineation Map shows the boundaries of the wellhead protection area(s).
3. The Discrete Source Map identifies the location of known contaminants within the wellhead protection area.
4. The Land Use Map shows land use or land cover within the wellhead protection area(s).

Using these maps and the supporting tables, DNREC identifies the potential sources of contamination and assesses the susceptibility of public-water sources to these contaminants.

The Department of Health and Social Services, Division of Public Health, Office of Drinking Water (DPH-ODW) samples all public wells and performs the analysis in their Certified Drinking Water Laboratory. They provide the chemical and biological analysis information for the Assessments. They also provide the daily population of persons served by the system.

## Location and Population Served

Blades Water is located in the Town of Blades on the southwest corner of West 4th Street and Market Street. (Appendix A, Map 1). This public water supply system provides water to an average daily population of 1,200 residential consumers from January 1 to December 31 through 468 residential service connections.

## Geology and Hydrogeology

Hydrogeology is the study of the interrelationships of geologic processes and materials with groundwater. These materials are deposited over geologic time with changes in the earth's environment. These deposits become layers. Some materials can easily transmit water while others slow its movement. Materials that transmit water are aquifers; those that stop its movement are confining layers. The Source Water Assessment Protection Program (SWAPP) identifies three types of aquifers; unconfined, confined, and semiconfined.

The water table aquifer is an unconfined aquifer because there are no confining beds between the saturated materials and the ground surface. A confining bed overlies a confined aquifer (Figure 1). These confining layers are generally composed of silts or clays. A leaky confining layer usually overlies semiconfined aquifers. An aquifer may be semiconfined aquifer because the overlying confining layer does not extend far enough laterally to inhibit vertical movement of water.

The Town of Blades withdraws water from three wells in the unconfined Columbia Group aquifer. The surficial unit of the unconfined aquifer is the Beaverdam Formation (Ramsey and Tomlinson, 2014). Within the models domain, the Beaverdam Formation is underlain by the confined Manokin aquifer in the northern portion and the sub cropping Pocomoke aquifer in the south (McLaughlin et al., 2015).

Within the study area, the Manokin aquifer dips to the southeast from depths of approximately -50 to -75 feet msl (McLaughlin et al., 2015). It is confined in most of the area. However there are areas where the confining unit between the unconfined aquifer has eroded and the sands of the unconfined aquifer are in direct contact with those of the Manokin (McLaughlin et al., 2015).

The sub cropping Pocomoke aquifer overlies the confined Manokin aquifer. In some areas the Manokin aquifer may be overlain by a few feet to tens of feet of Pocomoke sand with no confining unit (McLaughlin et al., 2015). In the subcrop area the sands of the unconfined aquifer are hydrologically connected to the Pocomoke aquifer.

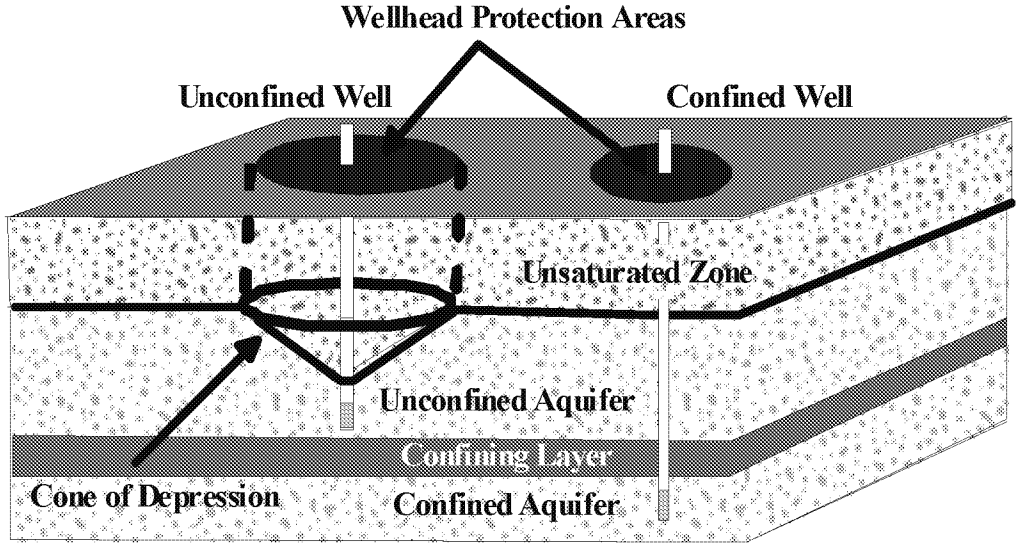


**Figure 1. Wellhead Protection Areas**
The source of most drinking water in Delaware is from aquifers. The water table aquifer is unconfined because there are no confining beds between the saturated materials and the ground surface. A confining bed overlies a confined aquifer. Unconfined aquifers draw down the water table creating a cone of depression.

Within the subcrop area for the Pocomoke aquifer, the confining units that separate the overlying Beaverdam Formation is eroded. In places, the sands of the Pocomoke aquifer are in direct contact with the Beaverdam Formation and acts as part of the unconfined aquifer (McLaughlin et al., 2015).

In the modeled area, the Beaverdam Formation consists of two stratigraphic units. The upper unit ranges in color from yellow-orange, light brown and light gray. It is composed of silty, fine to medium quartzose to moderately feldspathic sand, sandy silt, clayey sandy silt and clayey silt beds that are up to 35 feet thick. The lower beds are commonly gravelly and are up to 70 feet thick (Andres and Ramsey, 1995).

The Beaverdam Formation is of Pliocene age. The Pliocene Epoch began approximately 5.3 million years ago and ended approximately 2.6 million years ago (Walker et al., 2012). The Beaverdam Formation is interpreted as fluvial to estuarine deposits of late Pliocene age (Groot and Jordan, 1999; Groot et al., 1990; McLaughlin et al., 2015; Ramsey, 2010).

## Public Water Supply Well Information

When a public well is drilled, the driller files a Completion Report. The Completion Report contains the construction details and a Formation Log. The construction details include the diameter of the well, the depth of the well, and the length of the screen. The length of the screen and its depth determines the screen interval.

How much water the well can pump is limited to the capacity of the pump and how much water the aquifer can produce. This is called the well capacity. It is reported in gallons per minute (gpm). Hydrologists determine the aquifer the well pumps water from by the depth of the screen interval. They use geologic information from the Delaware Geological Survey (DGS) and historical well permitting records to construct a geologic profile to identify the aquifer. The information about the construction, operation, and aquifer assignment of the wells serving Blades Water are in Table 1.

This assessment identified additional wells associated with this public water system (Appendix E., Table 15).

**Table 1. Well Construction Data**

Completion Reports filed by the well driller includes information about the construction and operation of each well.

| DNREC ID | Local ID | Allocation No. | Year Constructed | Well Capacity (gpm) | Diameter (inches) | Screen Interval (fbgs) | Aquifer |
|---|---|---|---|---|---|---|---|
| 40024 | 1 | 89-0001 | 1978 | 150 | 8 | 66 - 96 | Columbia Group |
| 40025 | 2 | 89-0001 | 1978 | 150 | 8 | 66 - 96 | Columbia Group |
| 248353 | 3 | - | 2014 | 150 | 8 | 65 - 90 | Columbia Group |

* fbgs = feet below ground surface

## Wellhead Protection Area Delineation

The mapping of the wellhead protection area is called delineation. Wellhead protection areas are surface and subsurface areas surrounding public water supply wells that contribute water to the well. The delineation identifies land use and land use activities within the wellhead protection area that may adversely affect the quantity or quality of ground water pumped by the well.

The wellhead protection area for Blades Water contains three wells (Appendix A, Map 2). These wells withdraw water from the unconfined Columbia Group aquifer. The individual wellhead protection areas for each well were delineated using a computer model (Table 2a). The Source Water Assessment and Protection Program uses the term well field to refer to the area where multiple wells belonging to the same system are located. The delineated area of the well field at Blades Water is approximately 35.5 acres (Table 2b).

**Table 2a. Aquifer Type and Delineation Method**

Wellhead protection areas are delineated based on the well type of aquifer and the pumping capacity of the well (DNREC, 1999)

| DNREC ID | Local ID | Aquifer | Aquifer Type | Delineation Method |
|---|---|---|---|---|
| 40024 | 1 | Columbia Group | Unconfined | WhAEM Model |
| 40025 | 2 | Columbia Group | Unconfined | WhAEM Model |
| 248353 | 3 | Columbia Group | Unconfined | WhAEM Model |

**Table 2b. Delineated Source Water Areas**

The individual wellhead protection areas for this system overlap and are displayed on the map as one area

| Well Field | Wells | Acreage | Vulnerability |
|---|---|---|---|
| Blades Water | All | 35.5 | High |

Confined wells and wells pumping less than 50,000 gallons per day are delineated using a fixed radius of 150 feet. Wellhead protection areas for public wells screened in an unconfined aquifer that pump 50,000 gallons per day or greater are delineated using a computer model. Wells screened in a semiconfined aquifer are treated as unconfined wells. Because public wells are often constructed with a design capacity greater than the amount of water that will be withdrawn, the design capacity is not used to determine the delineation method.

If the well(s) withdraws 50,000 gallons per day or greater, the well requires an allocation permit. An allocation permit requires the owner submit water use data. This data can be used to determine the rate of withdrawal used in the model.

Blades Water reported using an average of 114,502 gallons of water per day based on water use data from 2013 to 2017, the wellhead protection area for this system was delineated using the geohydrology computer model Wellhead Analytic Element Model (WhAEM). The U. S. EPA developed WhAEM for use in source water assessments (Kraemer, 2010).

Ground water models are computer generated representations of the hydrogeologic system. The modeler builds the modeled system using topographic maps and stream flow data. Good modeling practices require a balance between the realism of the model and the practical limitations of using parameters to generate the resulting ground-water flow model (Kraemer, 2010).

WhAEM 2000 allows the modeler to set parameters to simulate the hydrologic conditions in the study area. These include the amount of precipitation as recharge, aquifer properties, and the duration of time that is being modeled (Table 2c).

Once the model is calibrated, the information about the well including pumping rates, well radius, particles, and release depth are inserted into the model to simulate water withdrawal (Table 2d). Each well at Blades Water was modeled at the rate indicated in Table 2d.

Because of the limitation of the WhAEM model, the delineated wellhead protection area is conservative. It may be larger than a capture zone produced by a more complex model. However, without additional data required for more complex modeling, WhAEM delineations do provide wellhead protection areas that protect the public drinking water supply.

Complete information regarding WhAEM can be found on the EPA website, http://www.epa.gov/athens/software/whaem/index.html.

**Table 2c. Model Parameters**

| Property | Value | Units | Reference |
|---|---|---|---|
| Duration | 5 | years | DNREC, 1999 |
| Recharge | 10 | inches/yr. | Johnston, 1973 |
| Porosity | 0.2 | percent | Freeze and Cherry, 1979 |
| Hydraulic Conductivity | 110 | feet/day | Andres, 1994 |
| Base of Aquifer | 72 | feet below sea level | Andres and Ramsey, 1995 & McLaughlin et al., 2015 |

**Table 2d. Model Settings**

| DNREC ID | Pumping Rate ($ft^3$/day) | Well Radius (feet) | Number of Particles | Release Depth (Elevation) |
|---|---|---|---|---|
| 40024 | 6,123 | 4 | 20 | -62 |
| 40025 | 4,855 | 4 | 20 | -62 |
| 248353 | 4,329 | 4 | 20 | -61 |

## Vulnerability Determination

The vulnerability is the relative ease that contaminants, if released into a wellhead protection area, could enter a public supply well at concentrations that may affect public health. The vulnerability is determined by reviewing the aquifer characteristics, well integrity, and screen depth. Individual wells are ranked as having low, medium, or high vulnerability (DNREC, 1999). The ranking considers the type of aquifer, hydrogeologic setting, well construction, and geographical setting.

Blades Water uses three wells to provide drinking water to the system. These wells are classified as having a high vulnerability because they are drill to a depth of less than 100 feet and no significant clay layers exist between the ground surface and the well screen. As an unconfined well capable of pumping over 50,000 gallons per day, the wellhead protection areas are delineated using a computer model that simulates ground-water flow.

## Existing and Potential Sources of Contamination

The U.S. EPA's Safe Drinking Water Act Amendments of 1996 required States to determine the susceptibility of public drinking water wells to contamination (U.S. EPA, 1996). The two general types of contaminates are discrete sources and non-point sources. Ground water can also contain naturally occurring contaminants.

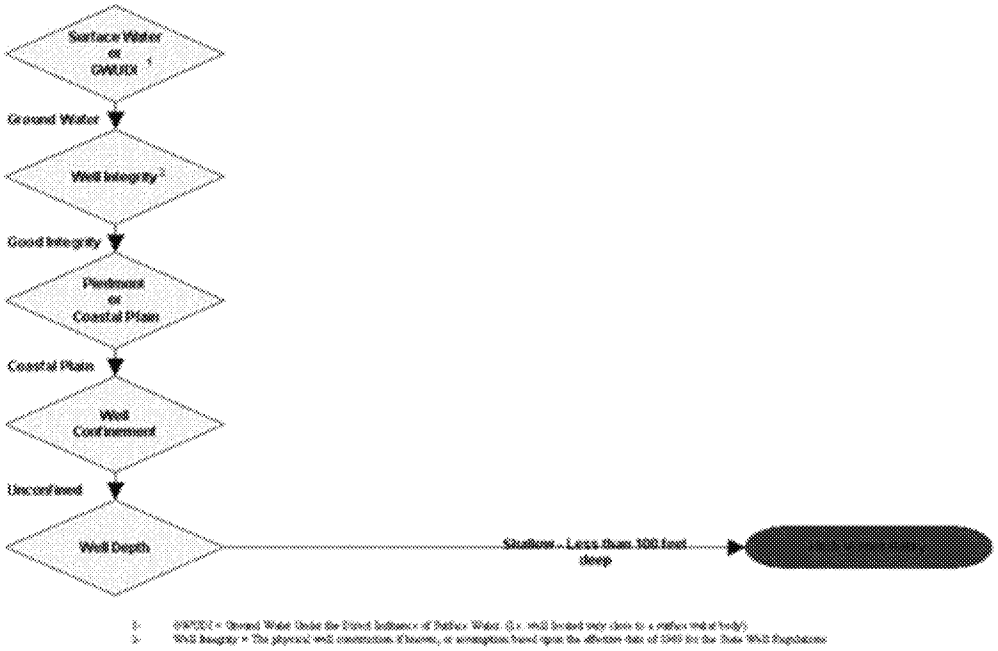

**Figure 2. Vulnerability Determination**
The vulnerability determination uses a flow diagram based on the well's location, construction, and type of aquifer.

### *Discrete Sources*

Discrete sources of contamination originate from an identifiable source. Examples of discrete sources are large on-site septic facilities or underground storage tanks (Table 3). The inventory of facilities that produce discrete sources of contamination is a product of DNREC's *Whole Basin Assessment Reports* (DNREC, 1998, 2001a, 2001b, and 2005). These datasets are routinely updated.

**Table 3. Types of Discrete Sources of Contamination**
Discrete sources of contamination are generated or manufactured from an identifiable source. The contamination released from these discrete sources may occur at concentrations that can be quantified.

| | |
|---|---|
| Underground Storage Tanks | Large On-Site Septic |
| Landfills/Dumps | Wastewater Spray Irrigation |
| National Pollutant Discharge Elimination System | Hazardous Waste Generators |
| State and Federal Superfund Sites | Waste Sludge Application |
| Animal Feedlot Operations | Combined Sewer Overflows |
| Tire Piles | Dredge Spoils |
| Toxic Release Inventory | Domestic Septic Systems |
| Pesticide Loading, Mixing, & Storage Facility | Salvage Yards |

The facility type determines the contaminant potential rating for a discrete source contaminant. Discrete source contaminants enter aquifers by infiltration through the ground. They enter the drinking water supply when they are drawn into wells. The Source Water Assessment rates the contamination potential from discrete sources as, negligible, low, medium, or high. Discrete sources of potential contamination were determined for the wellhead protection areas for the wells at Blades Water.

Current data indicates that there is an underground storage tank within the wellhead protection area for Blades Water. It is identified as Continental Baking Company (MAPID: UT5235) (Appendix A, Map 3. This site has a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds (Appendix B, Table 7).

Current data indicates that there is Super Fund Site within the wellhead protection area for Blades Water. It is identified as Peninsula Plating (MAPID: SF6833) (Appendix A, Map 3). This site is currently under investigation and as of this publication is unranked (Appendix B, Table 7)

***Non-Point Source Contamination***

Non-point source contamination is generated from land use activities and natural processes (Figure 3). They do not have an identifiable point where they enter the water. Like discrete source contaminants, non-point source contaminants enter ground water by infiltrating the land surface.

By analyzing aerial images, tables were generated to rate contaminant potential for land uses and land covers. The Land Use and Land Cover tables (Anderson et al., 1976) evaluate the probability that one or more of these non-point source contaminants will be present or generated by the associated land use or cover. This contamination potential is rated as, negligible, low, medium, or high. The individual contaminant potential based on land use was determined for each well.

Based on the 2007 Land Use and Land Cover (Appendix A, Map 4), approximately 60 percent of the total wellhead protection area for the system contains combined urban land use and 15 percent animal operations (CAFOs). Approximately 12 percent is commercial and 9 percent wetlands. Approximately 2.5 percent is residential with cropland and forested less than 1 percent (Figure 3).

The contaminant potential from combined urban land use within the wellhead protection area for Blades Water is medium for petroleum hydrocarbons, pesticides and other organic compounds. There is a negligible contaminant potential for nutrients, pathogens, PCBs, metals and other inorganic compounds (Appendix B, Table 9).

The contaminant potential from animal operations (CAFOs) land use within the wellhead protection area for Blades Water is medium for nutrients and pathogens. It has a negligible contaminant potential for petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals and other inorganic compounds (Appendix B, Table 9).

The contaminant potential from commercial land use within the wellhead protection area for Blades Water is medium for nutrients, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals and other inorganic compounds. It has a negligible contaminant potential for pathogens (Appendix B, Table 9).

The contaminant potential from wetlands land cover within the wellhead protection area for Blades Water is negligible for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals and other inorganic compounds (Appendix B, Table 9).

The contaminant potential from residential land cover within the wellhead protection area for Blades Water is medium for nutrients, pathogens, petroleum hydrocarbons and pesticides. There is a negligible contaminant potential for PCBs, other organic compounds, metals and other inorganic compounds (Appendix B, Table 9).

The contaminant potential from cropland land use within the wellhead protection area for Blades Water is high for nutrients. There is a medium contaminant potential for pesticides and other inorganic compounds. It has a negligible contaminant potential for pathogens, petroleum hydrocarbons, PCBs, other organic compounds, metals (Appendix B, Table 9).

The contaminant potential from forested land cover within the wellhead protection area for Blades Water is low for pesticides. There is a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, PCBs, other organic compounds, metals and other inorganic compounds (Appendix B, Table 9).

The contaminant potential from all land use within the wellhead protection area for Blades Water is high for nutrients and medium for pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals and other inorganic compounds. (Appendix B, Table 10).

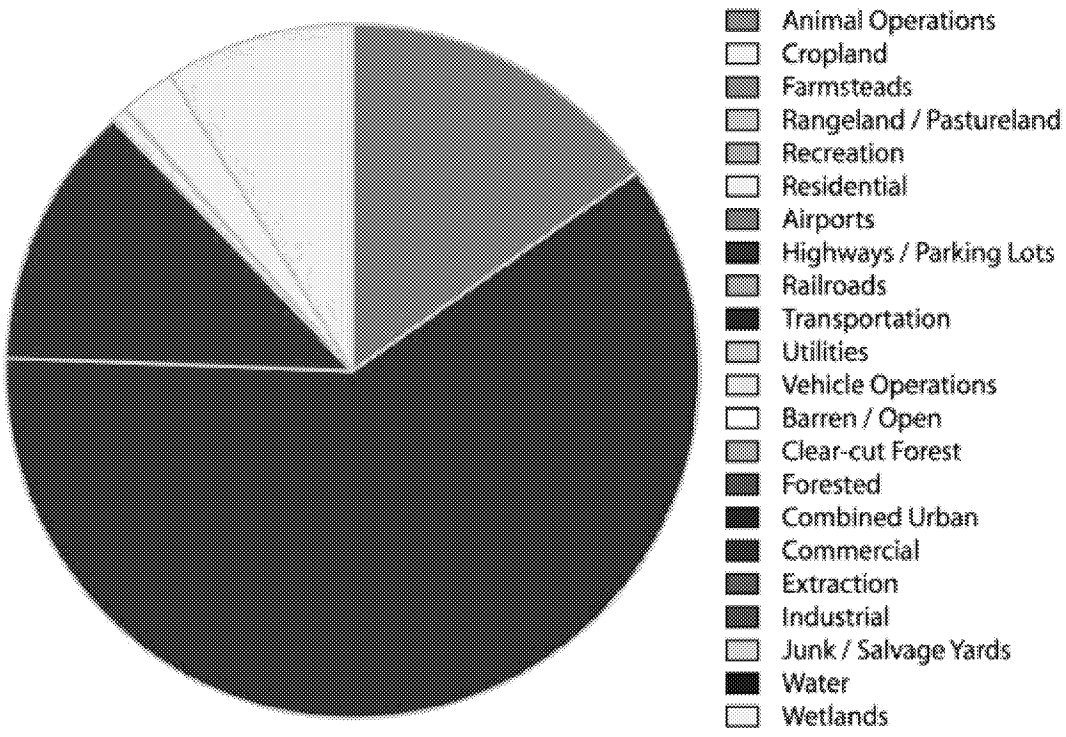


**Figure 3. Land Use in Wellhead Protection Area**
Land Use is determined by evaluating aerial images projected in Geographic Imaging Systems software programs. Land use tables are used to determine the contaminant potential associated with each land use category.

### *Roads and Railroads*

Roads and railroads are potential sources of contaminants. Maintenance of these thoroughfares such as salting, herbicide application, or a release of toxic materials could affect water quality. In addition, the operation of improperly maintained vehicles may deposit contaminates on these surfaces.

There were 1.48 miles roadways identified within Blades Water wellhead protection area (Table 4, Map 3).

**Table 4. Roads and Railways found within the Wellhead Protection Area**

| Well | Conduit | Miles |
|---|---|---|
| 40024 | Road | 1.48 |
| 40025 | Road | 1.48 |
| 248353 | Road | 1.48 |

## Water Quality

DPH-ODW tests raw ground water samples to determine the quality of the drinking water (DHSS, 2002). Raw water samples are taken before the water is treated. These results are referred to as analytical data. The DPH-ODW uses guidelines established by the EPA and State Regulations to set drinking water standards. These standards set a Maximum Contaminant Level (MCL) for each contaminant (EPA, 1996).

The State of Delaware identifies "contaminants of concern" as regulated substances with primary and secondary maximum contaminant levels and unregulated substances as listed in The State of Delaware Regulations Governing Public Drinking Water Systems dated, March 31, 1991 or as later revised (DNREC, 1999).

Delaware has also adopted State drinking water standards for several contaminants that are more protective than Primary and Secondary National and a Health Advisory Level for sodium. The associated MCL is considered the Drinking Water Standard. Any change in the MCL designation by the EPA or the DPH-ODW is incorporated into the source water assessments (DNREC, 1999). In the table heading for analytical data the distinction between Primary National Drinking Water Standard, Secondary National Drinking Water Standard, Health Advisory Level, and State of Delaware Drinking Water Standards is stated and the analyte is noted accordingly.

Enforcement of water quality standards is the responsibility of DPH-ODW. The primary focus of DPH-ODW is to assure that finished water meets the Drinking Water Standards. Public water providers use treatment methods to achieve compliance. Examples of treatment methods include, but not limited to, filtration, disinfection, fluoridation, and softening.

The DNREC Source Water Assessment and Protection Program is responsible for evaluating raw water to determine the possible sources of contaminants. By evaluating what types of contaminants and their concentrations, public water providers can determine if a problem exists and what treatment method to use to improve the quality of water they provide.

### *Naturally Occurring Contaminants*

Several naturally occurring potential contaminants may be identified as part of the Source Water Assessment. These include iron, chloride, sodium, radon, radium, manganese, arsenic, and sulfate.

### *Analytical Data*

The DPH-ODW analytical database was queried for raw/untreated water quality data for the past five years. The data for well 40024 showed concentrations of manganese exceeded the Secondary National Drinking Water Standard. The data showed concentrations of sodium exceeded the Health Advisory Level. The data showed concentrations of perfluorooctanoic acid (PFOA) of 102 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant (Appendix C, Table 13).

The data for well 40025 showed concentrations of manganese were greater than one-half] the Secondary National Drinking Water Standard. The data showed concentrations of PFOA of 82.6 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant (Appendix C, Table 13).

The data for well 248353 showed concentrations of cadmium, radium-226 and radium-228 exceeded the Primary National Drinking Water Standard. Concentrations of nitrate were greater than one-half the Primary National Drinking Water Standard.

The data also showed units of pH in well 248353 exceeded the Secondary National Drinking Water Standard. Concentrations of aluminum and manganese were greater than one-half the Secondary National Drinking Water Standard. The data showed concentrations of nickel were greater than one-half the State of Delaware Drinking Water Standards (Appendix C, Table 13).

The data for well 248353 showed concentrations of PFOA of 172 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant (Appendix C, Table 13).

## Water Treatment Methods

The DHSS Office of Drinking Water regulates water quality. They sample both raw and finished drinking water produced by public wells. Systems can treat raw water to reduce or remove contaminates. Treatment methods include filtering, softening, disinfection, and ion exchange. Treated water is considered finished water. This assessment focuses on the untreated, raw ground water source water.

Blades Water uses hypochlorination for disinfection, filtration and permanganate to remove iron, a pH adjustment to inhibit corrosion and adds fluoride. The system also uses carbon filtration to remove PFOA.

The quality of water delivered to the consumer is monitored by DPH-ODW. Community systems are required to supply their customers with a Consumer Confidence Reports. For more information about the water treatment used please, contact Blades Water or the DPH-ODW at (302) 741-8630.

## Susceptibility Determination

The vulnerability examines the public supply well's construction and geographic location. The susceptibility rating evaluates the possibility that that public supply well might draw contaminated water at concentrations of concern to public health. The susceptibility rating is determined by reviewing the vulnerability of the well, the discrete source contaminant inventory, land use contaminant potential, and the analytical data.

The Delaware Source Water Assessment and Protection Program identify eight classes of contaminants (Table 5). The susceptibility determinations are ranked on a scale of no susceptibility, very low, low, medium, high, very high, and exceeds drinking water standards (DNREC, 1999).

### *Contaminant Inventory*

There are two discrete sources of potential contamination in the wellhead protection areas for Blades Water public water system. These discrete sources may have elevated contaminant potentials that may affect the drinking water. As one discrete source is unranked, the contaminant potential from the ranked discrete sources is negligible for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic, metals, and other inorganic. There is a low contaminant potential for nutrients (Appendix B, Table 8).

The contaminant potential from all land use and land cover within the Blades Water wellhead protection area is high for nutrients and medium for pathogens, petroleum hydrocarbons, pesticides, PCB, other organic compounds, metals and other inorganic compounds (Appendix B, Table 11).

**Table 5. Contaminant Classes**

The Delaware Source Water Assessment and Protection Program identify eight classes of contaminants. The grouping of contaminants in classes presents a simpler method to determine the susceptibility rating.

| Contaminant Class | Examples |
|---|---|
| Nutrients | Nitrate, Nitrite |
| Pathogens | Coliform Bacteria, Cryptosporidium, Giardia |
| Petroleum Hydrocarbons | Gasoline, Heating Oil, Benzene, Toluene |
| Pesticides | Alachlor, Atrazine, Glyphosate |
| Polychlorinated Biphenyls | PCB |
| Other Organic Compounds | Vinyl Chloride, PCE, TCE |
| Metals | Copper, Arsenic, Iron, Manganese |
| Other Inorganic Compounds | Fluoride, Chloride, pH, Sulfate |

***Contaminant Inventory***

There are two discrete sources of potential contamination in the wellhead protection areas for Blades Water public water system. These discrete sources may have elevated contaminant potentials that may affect the drinking water. As one discrete source is unranked, the contaminant potential from the ranked discrete sources is negligible for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic, metals, and other inorganic. There is a low contaminant potential for nutrients (Appendix B, Table 8).

The contaminant potential from all land use and land cover within the Blades Water wellhead protection area is high for nutrients and medium for pathogens, petroleum hydrocarbons, pesticides, PCB, other organic compounds, metals and other inorganic compounds (Appendix B, Table 11).

### *Water Quality and Susceptibility*

According to the Source Water Assessment Plan, susceptibility ratings require adjustment if the analytical data finds levels of a contaminant equal to, or greater than one-half the maximum contaminant level (MCL).

The metals susceptibility rating was adjusted for well 40024 because the concentration of manganese exceeded the National Secondary Drinking Water Standards and the concentration of sodium exceeded the Health Advisory Level. The susceptibility rating for other organics was not adjusted because PFAS is not a regulated contaminant (Appendix C, Table 12).

The metals susceptibility rating was adjusted for well 40025 because the concentration of manganese were greater than one-half the National Secondary Drinking Water Standards. The susceptibility rating for other organics was not adjusted because PFOS is not a regulated contaminant (Appendix C, Table 12).

The nutrient susceptibility rating was adjusted for well 248353 because the concentration of nitrate was greater than one-half the Primary National Drinking Water Standards. The metals susceptibility rating was adjusted because the concentration of cadmium exceeded the Primary National Drinking Water Standards.

The other organic compounds susceptibility rating was adjusted for well 248353 because the pH exceeded the National Secondary Drinking Water Standards.

The metals susceptibility rating was adjusted for well 248353 because the concentration of because the concentration of manganese exceeded the National Secondary Drinking Water Standards. The concentration of aluminum were greater than one-half the National Secondary Drinking Water Standards and the concentration of nickel was greater than one-half the State of Delaware Drinking Water Standards (Appendix C, Table 12).

In addition, the levels of Radium-226 and 228 exceeded the Primary National Drinking Water Standards. The susceptibility rating for other organics was not adjusted because PFOS is not a regulated contaminant (Appendix C, Table 12).

### *Individual Susceptibility*

The wells at Blades Water have different characteristics. They vary in depth, location, date drilled, and pumping rate. These differences influence the delineation of the wellhead protection area, the vulnerability determination, and the contaminant inventory. This water system has one combined wellhead protection area for the system.

A Susceptibility Assessment was performed for each wellhead protection area. Each source of contaminant (discrete, land use, or analytical data) was rated according to its contaminant class. The well's vulnerability determination is also considered. The

susceptibility for each wellhead protection area was ranked by the highest source contaminant's susceptibility.

The wellhead protection area for well 40024 is exceedingly susceptible to metals based on the analytical data. It has a very high susceptibility rating for nutrients and a high susceptibility for pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals and other inorganic compounds based on land use activities (Appendix B, Table 12).

The wellhead protection area for well 40024 has a very high susceptibility rating metals based on the analytical data. It has a very high susceptibility rating for nutrients and a high susceptibility for pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds and other inorganic compounds based on land use activities (Appendix B, Table 12).

The wellhead protection area for well 248353 is exceedingly susceptible to metals and other inorganic compounds based on the analytical data. It has a very high susceptibility rating for nutrients based on the analytical data. It has a high susceptibility for pathogens, petroleum hydrocarbons, pesticides, PCBs and other organic compounds based on land use activities (Appendix B, Table 12).

***System Susceptibility***

Within a public drinking water system, each well could have a different susceptibility rating. The system susceptibility ranks the wells as a group. Blades Water is exceedingly susceptible metals and other inorganic compounds. It has a very high susceptibility rating for nutrients and a high susceptibility for pathogens, petroleum hydrocarbons, pesticides, PCBs and other organic compounds (Table 6).

**Table 6. System Susceptibility Rating**

The system susceptibility ranks the wells as a group. An individual well can dramatically raise a system's rating.

| Susceptibility | Contaminant Class |
|---|---|
| Exceeds | Metals<br>Other Inorganic Compounds |
| Very High | Nutrients |
| High | Pathogens<br>Petroleum Hydrocarbons<br>Pesticides<br>PCBs<br>Other Organic Compounds |

## Summary

The Delaware Department of Natural Resources and Environmental Control's (DNREC) Division of Water Resources has completed the Source Water Assessment for the public water supply wells for Blades Water. This Assessment is required under the 1996 amendments to the Safe Drinking Water Act. The compiling of this assessment followed the methods specified in the State of Delaware Source Water Assessment Plan (DNREC, 1999).

Blades Water uses three wells to provide drinking water to the system. These wells are classified as having a high vulnerability because they are drill to a depth of less than 100 feet and no significant clay layers exist between the ground surface and the well screen. As an unconfined well capable of pumping over 50,000 gallons per day, the wellhead protection areas are delineated using a computer model that simulates ground-water flow.

This public water supply system provides water to an average daily population of 1,200 residential consumers from January 1 to December 31 through 468 residential service connections.

Current data indicates that there is an underground storage tank within the wellhead protection area for Blades Water. This site has a negligible contaminant potential for nutrients, pathogens, petroleum hydrocarbons, pesticides, PCBs, other organic compounds, metals, and other inorganic compounds. In addition, current data also indicates that there is Super Fund Site within the wellhead protection area for Blades Water. This site is currently under investigation and as of this publication is unranked.

Based on the 2007 Land Use and Land Cover (Appendix A, Map 4), approximately 60 percent of the total wellhead protection area for the system contains combined urban land use and 15 percent animal operations (CAFOs). Approximately 12 percent is commercial and 9 percent wetlands. Approximately 2.5 percent is residential with cropland and forested less than 1 percent.

The DPH-ODW analytical database was queried for raw/untreated water quality data for the past five years. The data for well 40024 showed concentrations of manganese exceeded the Secondary National Drinking Water Standard. The data showed concentrations of sodium exceeded the Health Advisory Level. The data showed concentrations of perfluorooctanoic acid (PFOA) of 102 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant (Appendix C, Table 13).

The data for well 40025 showed concentrations of manganese were greater than one-half] the Secondary National Drinking Water Standard. The data showed concentrations of PFOA of 82.6 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant.

The data for well 248353 showed concentrations of cadmium, radium-226 and radium-228 exceeded the Primary National Drinking Water Standard. Concentrations of nitrate were greater than one-half the Primary National Drinking Water Standard.

The data also showed concentrations of aluminum, manganese and pH for well 248353 were greater than one-half the Secondary National Drinking Water Standard. The data showed concentrations of nickel were greater than one-half the State of Delaware Drinking Water Standards.

The data for well 248353 showed concentrations of PFOA of 172 ng/L. The United States Environmental Protection Agency has issued a Health Advisory Level of 70 ng/L. However, at the time of this publication PFOA is not a regulated contaminant.

Within a public drinking water system, each well could have a different susceptibility rating. The system susceptibility ranks the wells as a group. Blades Water is exceedingly susceptible metals and other inorganic compounds. It has a very high susceptibility rating for nutrients and a high susceptibility for pathogens, petroleum hydrocarbons, pesticides, PCBs and other organic compounds.

## References


Anderson, J. R., Hardy, E. E., Roach, J. T., and Witmer, R. E., 1976, A Land Use and Land Cover Classification System for Use with Remote Sensor Data, Geological Survey Professional Paper 964: Washington, D.C., U.S. Gov. Printing Office, p. 41

Andres, A. S., and Ramsey, K. W., 1995, Geology of the Seaford Area, Delaware: Delaware Geological Survey, Geologic Map Series No. 9, scale 1:24,000.

Delaware Department of Natural Resources and Environmental Control. (1999). The State of Delaware Source Water Assessment Plan: Dover, DE, p. 301.

Delaware Department of Natural Resources and Environmental Control. (1998, 2001a, 2001b, and 2005). Whole Basin Assessment Reports. [Electronic Version] Retrieved January 5, 2009, from http://www.dnrec.delaware.gov/wholebasin

DHSS-Office of Drinking Water, Div. of Public Health, 2002, State of Delaware Regulations Governing Public Drinking Water Systems: Dover, DE, Division of Public Health, p. 155.

EPA -United States Environmental Protection Agency. (1996). Safe Drinking Water Contaminants, EPA 816-F-09-0004 [Electronic Version]. Retrieved June 2010, from http://www.epa.gov/safewater/contaminants/index.html

EPA -United States Environmental Protection Agency. (1996). Safe Drinking Water Act Retrieved May 2010, from http://www.epa.gov/safewater/sdwa/

EPA –United States Environmental Protection Agency. (1997). State Source Water Assessment and Protection Programs Guidance: Final Guidance, EPA 816-R-97-009 [Electronic Version]. Retrieved May 4, 2010, from http://www.epa.gov/safewater/sourcewater/pubs/swpguidance.pdf.

EPA –United States Environmental Protection Agency. (1974). Summary of the Safe Drinking Water Act: 42 U.S.C. §300f et seq. (1974) [Electronic Version]. Retrieved May 4, 2010, from http://www.epa.gov/lawsregs/laws/sdwa.html

Kraemer, S.R., Haitjema, H.M., and Kelson, V.A., 2010, Working with WhAEM 2000: Washington, DC, Office of Research and Development, 79 p.

McLaughlin, P. P., Tomlinson, J. L., and Lawson, A. L., 2015, Aquifers and Groundwater Withdrawals, Kent and Sussex Counties, Delaware, Contract Report for Delaware Department Natural Resources and Environmental Control, Water Division, Water, Water Supply, Delaware Geological Survey, p. 127.

Ramsey, K. W., and Tomlinson, J. L., 2014, Geological Map of the Sharptown, Laurel, Hebron, and Delmar Quadrangles, Delaware: Delaware Geological Survey, Geologic Map Series No. 22, scale 1:24,000.

Walker, J.D., and Geissman, J.W., compilers, 2009, Geologic Time Scale: The Geological Society of America, doi:10.1130/2009.CTS004R2C.

# Appendix A. Maps

Map 1: Base Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-9945 or Fax: (302) 739-2296 to request more information regarding this map.

Map 2: Delineation Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-9945 or Fax: (302) 739-2296 to request more information regarding this map.

Map 3: Discrete Source Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-9945 or Fax: (302) 739-2296 to request more information regarding this map.

Map 4: Land Use Map

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Please contact the Source Water Assessment and Protection Program at Phone: (302) 739-9945 or Fax: (302) 739-2296 to request more information regarding this map.

# Appendix B. Tables

## Table 7. Contaminant Potential from Individual Types of Discrete Sources by WHPA

DNREC stores information of known discrete sources of contamination in databases. This information is accessed and used to rate the contaminant potential from each source. The contaminant potential is rated for each of the eight-contaminant classes. It is reported as negligible (NEG), LOW, medium (MED.), and HIGH for each wellhead protection area.

| Wellhead Protection Area | Discrete Sources | Site ID | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|---|---|
| 40024 | Underground Storage Tanks | 5-000075 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40025 | Underground Storage Tanks | 5-000075 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 248353 | Underground Storage Tanks | 5-000075 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40024 | Super Fund Sites | DE-0287 | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked |
| 40025 | Super Fund Sites | DE-0287 | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked |
| 248353 | Super Fund Sites | DE-0287 | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked | Unranked |

## Table 8. Contaminant Potential from Total Discrete Sources by System

DNREC stores information of known discrete sources of contamination in databases. This information is accessed and used to rate the contaminant potential from each source. The contaminant potential is rated for each of the eight-contaminant classes. It is reported as negligible (NEG), LOW, medium (MED.), and HIGH for the system.

| System Summary | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|
| Overall | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |

## Table 9. Contaminant Potential from Each Land Use within WHPA

DNREC identifies land use from aerial images. Each land use has specific contaminants associated with it. The contaminant potential is rated for each of the eight-contaminant classes. It is reported as negligible (NEG), LOW, medium (MED.), and HIGH for each wellhead protection area.

| WHPA | Land Use | Area (acres) | Percent | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40024 | Combined Urban | 21.44 | 60.26 | NEG. | NEG. | MED. | MED. | NEG. | MED. | NEG. | NEG. |
| 40024 | CAFOs | 5.44 | 15.3 | MED. | MED. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40024 | Commercial | 4.38 | 12.32 | MED. | NEG. | MED. | MED. | MED. | MED. | MED. | MED. |
| 40024 | Wetland | 3.14 | 8.84 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40024 | Residential | 0.88 | 2.47 | MED. | MED. | MED. | MED. | NEG. | NEG. | NEG. | NEG. |
| 40024 | Cropland | 0.26 | 0.75 | High | NEG. | NEG. | MED. | NEG. | NEG. | NEG. | MED. |
| 40024 | Forested | 0.01 | 0.03 | NEG. | NEG. | NEG. | LOW | NEG. | NEG. | NEG. | NEG. |
| 40025 | Combined Urban | 21.44 | 60.26 | NEG. | NEG. | MED. | MED. | NEG. | MED. | NEG. | NEG. |
| 40025 | CAFOs | 5.44 | 15.3 | MED. | MED. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40025 | Commercial | 4.38 | 12.32 | MED. | NEG. | MED. | MED. | MED. | MED. | MED. | MED. |
| 40025 | Wetland | 3.14 | 8.84 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 40025 | Residential | 0.88 | 2.47 | MED. | MED. | MED. | MED. | NEG. | NEG. | NEG. | NEG. |
| 40025 | Cropland | 0.26 | 0.75 | High | NEG. | NEG. | MED. | NEG. | NEG. | NEG. | MED. |
| 40025 | Forested | 0.01 | 0.03 | NEG. | NEG. | NEG. | LOW | NEG. | NEG. | NEG. | NEG. |
| 248353 | Combined Urban | 21.44 | 60.26 | NEG. | NEG. | MED. | MED. | NEG. | MED. | NEG. | NEG. |

| WHPA | Land Use | Area (acres) | Percent | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 248353 | CAFOs | 5.44 | 15.3 | MED. | MED. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 248353 | Commercial | 4.38 | 12.32 | MED. | NEG. | MED. | MED. | MED. | MED. | MED. | MED. |
| 248353 | Wetland | 3.14 | 8.84 | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. | NEG. |
| 248353 | Residential | 0.88 | 2.47 | MED. | MED. | MED. | MED. | NEG. | NEG. | NEG. | NEG. |
| 248353 | Cropland | 0.26 | 0.75 | High | NEG. | NEG. | MED. | NEG. | NEG. | NEG. | MED. |
| 248353 | Forested | 0.01 | 0.03 | NEG. | NEG. | NEG. | LOW | NEG. | NEG. | NEG. | NEG. |

## Table 10. Contaminant Potential from Total Land Use within WHPA

DNREC identifies land use from aerial images. Each land use has specific contaminants associated with it. The contaminant potential is rated for each of the eight-contaminant classes. It is reported as negligible (NEG), LOW, medium (MED.), and HIGH for each wellhead protection area.

| WHPA Summary | Land Use | Area(acres) | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|---|---|
| 40024 | All | 35.55 | HIGH | MED. | MED. | MED. | MED. | MED. | MED. | MED. |
| 40025 | All | 35.55 | HIGH | MED. | MED. | MED. | MED. | MED. | MED. | MED. |
| 248353 | All | 35.55 | HIGH | MED. | MED. | MED. | MED. | MED. | MED. | MED. |

## Table 11. Contaminant Potential from Total Land Use within the System

DNREC identifies land use from aerial images. Each land use has specific contaminants associated with it. The contaminant potential is rated for each of the eight-contaminant classes. It is reported as negligible (NEG), low, medium (MED.), and high for the system.

| System Summary | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|
| Overall | HIGH | MED. | MED. | MED. | MED. | MED. | MED. | MED. |

## Table 12. Individual Wellhead Protection Area Susceptibility

The vulnerability determination examines the possibility of a contaminant being drawn into a public drinking water through the well. The susceptibility rating evaluates the probability of a contaminant, if present, could enter the water supply. The susceptibility ratings for each of the eight-contaminant classes are reported as; very low, low, medium (MED.), high, very high, and exceeds standards for each wellhead protection area.

| Wellhead Protection Area | Based On | Vulnerability | Nutrients | Pathogens | Petroleum Hydrocarbons | Pesticides | PCBs | Other Organic Compounds | Metals | Other Inorganic Compounds |
|---|---|---|---|---|---|---|---|---|---|---|
| 40024 | Discrete Sources | HIGH | LOW | LOW | LOW | LOW | LOW | LOW | LOW | LOW |
| 40024 | Land Use | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH |
| 40024 | Analytical Data | HIGH | - | - | - | - | - | - | EXCEEDS | - |
| 40024 | Overall | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | EXCEEDS | HIGH |
| 40025 | Discrete Sources | HIGH | LOW | LOW | LOW | LOW | LOW | LOW | LOW | LOW |
| 40025 | Land Use | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH |
| 40025 | Analytical Data | HIGH | - | - | - | - | - | - | HIGH | - |
| 40025 | Overall | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | VERY HIGH | HIGH |
| 248353 | Discrete Sources | HIGH | LOW | LOW | LOW | LOW | LOW | LOW | LOW | LOW |
| 248353 | Land Use | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | HIGH |
| 248353 | Analytical Data | HIGH | VERY HIGH | - | - | - | - | - | EXCEEDS | EXCEEDS |
| 248353 | Overall | HIGH | VERY HIGH | HIGH | HIGH | HIGH | HIGH | HIGH | EXCEEDS | EXCEEDS |

# Appendix C. Analytical Data

## Table 13. Available Analytical Data

The DHSS Office of Drinking Water analyzes water samples for public drinking water systems. They have provided the last five years of data for this assessment. All standards refer to the maximum contaminant limit (MCL) established by the EPA except as noted. National Secondary Drinking Water Standards are noted by *, Health Advisory Limits by **, and State of Delaware Standards by ***.

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Metals | 40024 | ANTIMONY TOTAL | 2013-04-30 | < 0.0005 | 0.006 | mg/L |
| Metals | 40024 | ARSENIC | 2013-04-30 | < 0.0005 | 0.01 | mg/L |
| Metals | 40024 | BARIUM | 2013-04-30 | 0.1291 | 1 | mg/L |
| Metals | 40024 | BERYLLIUM, TOTAL | 2013-04-30 | < 0.0005 | 0.004 | mg/L |
| Metals | 40024 | CADMIUM | 2013-04-30 | < 0.0005 | 0.005 | mg/L |
| Metals | 40024 | CHROMIUM | 2013-04-30 | 0.0026 | 0.1 | mg/L |
| Metals | 40024 | COPPER FREE | 2013-04-30 | 0.0015 | 1 | mg/L |
| Metals | 40024 | LEAD | 2013-04-30 | 0.0029 | 0.015 | mg/L |
| **Metals** | **40024** | ***MANGANESE** | **2013-04-30** | **0.0718** | **0.05** | **mg/L** |
| Metals | 40024 | MERCURY | 2013-04-30 | < 0.0005 | 0.002 | mg/L |
| Metals | 40024 | ***NICKEL | 2013-04-30 | 0.0031 | 0.1 | mg/L |
| Metals | 40024 | SELENIUM | 2013-04-30 | < 0.01 | 0.05 | mg/L |
| Metals | 40024 | THALLIUM, TOTAL | 2013-04-30 | < 0.0005 | 0.002 | mg/L |
| Metals | 40024 | URANIUM-238 | 2013-04-30 | < 0.0005 | 0.03 | mg/L |
| Metals | 40024 | ANTIMONY TOTAL | 2014-04-23 | < 0.0005 | 0.006 | mg/L |
| Metals | 40024 | ARSENIC | 2014-04-23 | < 0.0005 | 0.01 | mg/L |
| Metals | 40024 | BARIUM | 2014-04-23 | 0.094 | 1 | mg/L |
| Metals | 40024 | BERYLLIUM, TOTAL | 2014-04-23 | < 0.0005 | 0.004 | mg/L |
| Metals | 40024 | CADMIUM | 2014-04-23 | < 0.0005 | 0.005 | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Metals | 40024 | CHROMIUM | 2014-04-23 | 0.0012 | 0.1 | mg/L |
| Metals | 40024 | COPPER FREE | 2014-04-23 | 0.0029 | 1 | mg/L |
| Metals | 40024 | LEAD | 2014-04-23 | 0.0017 | 0.015 | mg/L |
| **Metals** | **40024** | ***MANGANESE** | **2014-04-23** | **0.0877** | **0.05** | **mg/L** |
| Metals | 40024 | MERCURY | 2014-04-23 | < 0.0005 | 0.002 | mg/L |
| Metals | 40024 | ***NICKEL | 2014-04-23 | 0.0027 | 0.1 | mg/L |
| Metals | 40024 | SELENIUM | 2014-04-23 | < 0.01 | 0.05 | mg/L |
| Metals | 40024 | URANIUM-238 | 2014-04-23 | < 0.0005 | 0.03 | mg/L |
| Other Inorganics | 40024 | ALKALINITY TOTAL | 2015-06-23 | 20.9 | Unregulated | mg/L |
| Other Inorganics | 40024 | *CHLORIDE | 2015-06-23 | 40.1 | 250 | mg/L |
| Other Inorganics | 40024 | ***FLUORIDE | 2015-06-23 | < 0.1 | 2 | mg/L |
| Other Inorganics | 40024 | *HARDNESS, TOTAL (AS CAC03) | 2015-06-23 | 39.4 | 200 | mg/L |
| Metals | 40024 | *IRON | 2015-06-23 | 0.13 | 0.3 | mg/L |
| Nutrients | 40024 | NITRATE | 2015-06-23 | 2.9 | 10 | mg/L |
| Nutrients | 40024 | NITRITE | 2015-06-23 | < 0.1 | 1 | mg/L |
| **Metals** | **40024** | ****SODIUM** | **2015-06-23** | **24.0** | **20** | **mg/L** |
| Other Inorganics | 40024 | *SULFATE | 2015-06-23 | 20.3 | 250 | mg/L |
| Other Inorganics | 40024 | *TDS | 2015-06-23 | 144 | 500 | mg/L |
| Pathogens | 40024 | TOTAL COLIFORM | 2015-06-23 | A | A | CFU |
| Other Organics | 40024 | TURBIDITY | 2015-06-23 | 0.17 | Unregulated | NTU |
| Metals | 40024 | MERCURY | 2015-10-19 | < 0.0002 | 0.002 | mg/L |
| Pathogens | 40024 | TOTAL COLIFORM | 2017-06-01 | A | A | CFU |
| Metals | 40024 | CHROMIUM | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 40024 | CHROMIUM DISSOLVED | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 40024 | CHROMIUM VI | 2018-01-22 | 2.7 | 100 | µg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Organics | 40024 | N-ETHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NETFOSAA) | 2018-01-22 | 1.67 | Unregulated | ng/L |
| Other Organics | 40024 | N-METHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NMEFOSAA) | 2018-01-22 | 2.72 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROBUTANESULFONIC ACID (PFBS) | 2018-01-22 | 5.85 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUORODECANOIC ACID (PFDA) | 2018-01-22 | 1.11 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUORODODECANOIC ACID (PFDOA) | 2018-01-22 | 0.48 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROHEPTANOIC ACID (PFHPA) | 2018-01-22 | 6.07 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROHEXANESULFONIC ACID (PFHXS) | 2018-01-22 | 23.5 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROHEXANOIC ACID (PFHXA) | 2018-01-22 | 11.9 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUORONONANOIC ACID (PFNA) | 2018-01-22 | 33.4 | Unregulated | ng/L |
| **Other Organics** | **40024** | **PERFLUOROOCTANESULFONIC ACID (PFOS)** | **2018-01-22** | **102** | **Unregulated** | **ng/L** |
| Other Organics | 40024 | PERFLUOROOCTANOIC ACID (PFOA) | 2018-01-22 | 15.5 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROTETRADECANOIC ACID (PFTEA) | 2018-01-22 | 0.25 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROTRIDECANOIC ACID (PFTRIA) | 2018-01-22 | 1.14 | Unregulated | ng/L |
| Other Organics | 40024 | PERFLUOROUNDECANOIC ACID (PFUNA) | 2018-01-22 | 0.96 | Unregulated | ng/L |
| Metals | 40025 | ANTIMONY TOTAL | 2013-04-30 | < 0.0005 | 0.006 | mg/L |
| Metals | 40025 | ARSENIC | 2013-04-30 | < 0.0005 | 0.01 | mg/L |
| Metals | 40025 | BARIUM | 2013-04-30 | 0.0975 | 1 | mg/L |
| Metals | 40025 | BERYLLIUM, TOTAL | 2013-04-30 | < 0.0005 | 0.004 | mg/L |
| Metals | 40025 | CADMIUM | 2013-04-30 | < 0.0005 | 0.005 | mg/L |
| Metals | 40025 | CHROMIUM | 2013-04-30 | 0.0018 | 0.1 | mg/L |
| Metals | 40025 | COPPER FREE | 2013-04-30 | 0.0121 | 1 | mg/L |
| Metals | 40025 | LEAD | 2013-04-30 | 0.0021 | 0.015 | mg/L |
| **Metals** | **40025** | ***MANGANESE** | **2013-04-30** | **0.0417** | **0.05** | **mg/L** |
| Metals | 40025 | MERCURY | 2013-04-30 | < 0.0005 | 0.002 | mg/L |
| Metals | 40025 | ***NICKEL | 2013-04-30 | 0.0018 | 0.1 | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Metals | 40025 | SELENIUM | 2013-04-30 | < 0.01 | 0.05 | mg/L |
| Metals | 40025 | THALLIUM, TOTAL | 2013-04-30 | < 0.0005 | 0.002 | mg/L |
| Metals | 40025 | URANIUM-238 | 2013-04-30 | < 0.0005 | 0.03 | mg/L |
| Metals | 40025 | ANTIMONY TOTAL | 2014-04-23 | < 0.0005 | 0.006 | mg/L |
| Metals | 40025 | ARSENIC | 2014-04-23 | < 0.0005 | 0.01 | mg/L |
| Metals | 40025 | BARIUM | 2014-04-23 | 0.1011 | 1 | mg/L |
| Metals | 40025 | BERYLLIUM, TOTAL | 2014-04-23 | < 0.0005 | 0.004 | mg/L |
| Metals | 40025 | CADMIUM | 2014-04-23 | < 0.0005 | 0.005 | mg/L |
| Metals | 40025 | CHROMIUM | 2014-04-23 | < 0.0005 | 0.1 | mg/L |
| Metals | 40025 | COPPER FREE | 2014-04-23 | 0.0011 | 1 | mg/L |
| Metals | 40025 | LEAD | 2014-04-23 | < 0.0005 | 0.015 | mg/L |
| **Metals** | **40025** | ***MANGANESE** | **2014-04-23** | **0.0343** | **0.05** | **mg/L** |
| Metals | 40025 | MERCURY | 2014-04-23 | < 0.0005 | 0.002 | mg/L |
| Metals | 40025 | ***NICKEL | 2014-04-23 | 0.0021 | 0.1 | mg/L |
| Metals | 40025 | SELENIUM | 2014-04-23 | < 0.01 | 0.05 | mg/L |
| Metals | 40025 | URANIUM-238 | 2014-04-23 | < 0.0005 | 0.03 | mg/L |
| Other Inorganics | 40025 | ALKALINITY TOTAL | 2015-06-23 | 10.9 | Unregulated | mg/L |
| Other Inorganics | 40025 | *CHLORIDE | 2015-06-23 | 9.4 | 250 | mg/L |
| Other Inorganics | 40025 | ***FLUORIDE | 2015-06-23 | < 0.1 | 2 | mg/L |
| Other Inorganics | 40025 | *HARDNESS, TOTAL (AS CAC03) | 2015-06-23 | 23.4 | 200 | mg/L |
| Metals | 40025 | *IRON | 2015-06-23 | < 0.1 | 0.3 | mg/L |
| Nutrients | 40025 | NITRATE | 2015-06-23 | 4.7 | 10 | mg/L |
| Nutrients | 40025 | NITRITE | 2015-06-23 | < 0.1 | 1 | mg/L |
| Metals | 40025 | **SODIUM | 2015-06-23 | 6.2 | 20 | mg/L |
| Other Inorganics | 40025 | *SULFATE | 2015-06-23 | 9.5 | 250 | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Inorganics | 40025 | *TDS | 2015-06-23 | 82 | 500 | mg/L |
| Pathogens | 40025 | TOTAL COLIFORM | 2015-06-23 | A | A | CFU |
| Other Organics | 40025 | TURBIDITY | 2015-06-23 | 0.06 | Unregulated | NTU |
| Metals | 40025 | CHROMIUM | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 40025 | CHROMIUM DISSOLVED | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 40025 | CHROMIUM VI | 2018-01-22 | 2.7 | 100 | µg/L |
| Other Organics | 40025 | N-ETHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NETFOSAA) | 2018-01-22 | 1.7 | Unregulated | ng/L |
| Other Organics | 40025 | N-METHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NMEFOSAA) | 2018-01-22 | 2.77 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROBUTANESULFONIC ACID (PFBS) | 2018-01-22 | 5.35 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUORODECANOIC ACID (PFDA) | 2018-01-22 | 0.56 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUORODODECANOIC ACID (PFDOA) | 2018-01-22 | 0.49 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROHEPTANOIC ACID (PFHPA) | 2018-01-22 | 4.92 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROHEXANESULFONIC ACID (PFHXS) | 2018-01-22 | 21.8 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROHEXANOIC ACID (PFHXA) | 2018-01-22 | 9.76 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUORONONANOIC ACID (PFNA) | 2018-01-22 | 21.5 | Unregulated | ng/L |
| Other Organics | **40025** | **PERFLUOROOCTANESULFONIC ACID (PFOS)** | **2018-01-22** | **82.6** | **Unregulated** | **ng/L** |
| Other Organics | 40025 | PERFLUOROOCTANOIC ACID (PFOA) | 2018-01-22 | 13.6 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROTETRADECANOIC ACID (PFTEA) | 2018-01-22 | 0.26 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROTRIDECANOIC ACID (PFTRIA) | 2018-01-22 | 1.16 | Unregulated | ng/L |
| Other Organics | 40025 | PERFLUOROUNDECANOIC ACID (PFUNA) | 2018-01-22 | 0.98 | Unregulated | ng/L |
| Other Organics | 248353 | 1,1,1,2-TETRACHLOROETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,1,1-TRICHLOROETHANE | 2013-04-02 | < 0.5 | 200 | µg/L |
| Other Organics | 248353 | 1,1,2,2-TETRACHLOROETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,1,2-TRICHLOROETHANE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Other Organics | 248353 | 1,1-DICHLOROETHANE | 2013-04-02 | < 0.5 | 7 | µg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Organics | 248353 | 1,1-DICHLOROETHYLENE | 2013-04-02 | < 0.5 | 7 | µg/L |
| Other Organics | 248353 | 1,2,3-TRICHLOROBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,2,3-TRICHLOROPROPANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,2,4-TRICHLOROBENZENE | 2013-04-02 | < 0.5 | 70 | µg/L |
| Other Organics | 248353 | 1,2,4-TRIMETHYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,2-DIBROMO-3-CHLOROPROPANE | 2013-04-02 | < 0.02 | 0.2 | µg/L |
| Other Organics | 248353 | 1,2-DICHLOROETHANE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Other Organics | 248353 | 1,2-DICHLOROPROPANE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Other Organics | 248353 | 1,3,5-TRIMETHYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 1,3-DICHLOROPROPANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | 2,2-DICHLOROPROPANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Pesticides | 248353 | 2,4,5-TP | 2013-04-02 | < 0.5 | 50 | µg/L |
| Pesticides | 248353 | 2,4-D | 2013-04-02 | < 1 | 70 | µg/L |
| Other Inorganics | 248353 | ALKALINITY CACO3 STABILITY | 2013-04-02 | 3 | Unregulated | mg/L |
| **Metals** | **248353** | ***ALUMINUM** | **2013-04-02** | **0.0189** | **0.05 - 0.2** | **mg/L** |
| Metals | 248353 | ANTIMONY TOTAL | 2013-04-02 | < 0.002 | 0.006 | mg/L |
| PCBs | 248353 | AROCLOR 1016 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1221 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1232 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1242 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1248 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1254 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| PCBs | 248353 | AROCLOR 1260 | 2013-04-02 | < 0.49 | 0.5 | µg/L |
| Metals | 248353 | ARSENIC | 2013-04-02 | < 0.001 | 0.01 | mg/L |
| Other Inorganics | 248353 | ASBESTOS | 2013-04-02 | < 0.19 | 7 | MFL |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Pesticides | 248353 | ATRAZINE | 2013-04-02 | < 0.19 | 3 | µg/L |
| Metals | 248353 | BARIUM | 2013-04-02 | < 0.5 | 1 | mg/L |
| Petroleum Hydrocarbons | 248353 | BENZENE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Pesticides | 248353 | BENZO (A ) PYRENE | 2013-04-02 | < 0.095 | 0.2 | µg/L |
| Metals | 248353 | BERYLLIUM, TOTAL | 2013-04-02 | 0.0006 | 0.004 | mg/L |
| Pesticides | 248353 | BHC-GAMMA | 2013-04-02 | < 0.095 | 0.2 | µg/L |
| Other Organics | 248353 | BROMOBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | BROMOCHLOROMETHANE | 2013-04-02 | < 1.5 | Unregulated | µg/L |
| Other Organics | 248353 | BROMODICHLOROMETHANE | 2013-04-02 | < 0.5 | TTHM 80 | µg/L |
| Other Organics | 248353 | BROMOFORM | 2013-04-02 | < 0.5 | TTHM 80 | µg/L |
| Other Organics | 248353 | BROMOMETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| **Metals** | **248353** | **CADMIUM** | **2013-04-02** | **0.0185** | **0.005** | **mg/L** |
| Metals | 248353 | CALCIUM | 2013-04-02 | 4.3 | Unregulated | mg/L |
| Pesticides | 248353 | CARBOFURAN | 2013-04-02 | < 1 | 40 | µg/L |
| Other Organics | 248353 | CARBON TETRACHLORIDE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Other Organics | 248353 | CARBONTOTAL | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | CHLORDANE | 2013-04-02 | < 0.49 | 2 | µg/L |
| Other Inorganics | 248353 | *CHLORIDE | 2013-04-02 | 13 | 250 | mg/L |
| Other Organics | 248353 | CHLOROETHANE | 2013-04-02 | < 4 | Unregulated | µg/L |
| Other Organics | 248353 | CHLOROFORM | 2013-04-02 | < 0.5 | TTHM 80 | µg/L |
| Other Organics | 248353 | CHLOROMETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Metals | 248353 | CHROMIUM | 2013-04-02 | < 0.002 | 0.1 | mg/L |
| Other Organics | 248353 | CIS-1,2-DICHLOROETHYLENE | 2013-04-02 | < 0.5 | 70 | µg/L |
| Other Organics | 248353 | CIS-1,3-DICHLOROPROPENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Color | 248353 | *COLOR | 2013-04-02 | < 5 | 15 | Units |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Inorganics | 248353 | CONDUCTIVITY 25 C UMHOS/CM | 2013-04-02 | 127 | Unregulated | UMHO/CM |
| Metals | 248353 | COPPER FREE | 2013-04-02 | < 0.05 | 1 | mg/L |
| Other Inorganics | 248353 | CYANIDE | 2013-04-02 | < 0 .04 | 0.2 | mg/L |
| Pesticides | 248353 | DALAPON | 2013-04-02 | < 4 | 200 | µg/L |
| Other Organics | 248353 | DI(2-ETHYLHEXYL) ADIPATE | 2013-04-02 | < 0.47 | 400 | µg/L |
| Other Organics | 248353 | DI(2-ETHYLHEXYL) PHTHALATE | 2013-04-02 | < 0.095 | 6 | µg/L |
| Other Organics | 248353 | DIBROMOCHLOROMETHANE | 2013-04-02 | < 0.5 | TTHM 80 | µg/L |
| Other Organics | 248353 | DIBROMOMETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Pesticides | 248353 | DICAMBA | 2013-04-02 | < 1 | Unregulated | mg/L |
| Other Organics | 248353 | DICHLORODIFLUOROMETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | DICHLOROMETHANE | 2013-04-02 | < 0.5 | 5 | µg/L |
| Pesticides | 248353 | DINOSEB | 2013-04-02 | < 1 | 7 | µg/L |
| Pesticides | 248353 | DIQUAT | 2013-04-02 | < 2 | 20 | µg/L |
| Pesticides | 248353 | ENDOTHALL | 2013-04-02 | < 20 | 100 | µg/L |
| Petroleum Hydrocarbons | 248353 | ETHYLBENZENE | 2013-04-02 | < 0.5 | 700 | µg/L |
| Other Organics | 248353 | ETHYLENE DIBROMIDE | 2013-04-02 | < 0.02 | 0.05 | µg/L |
| Other Inorganics | 248353 | ***FLUORIDE | 2013-04-02 | < 0.1 | 2 | mg/L |
| Pesticides | 248353 | GLYPHOSATE | 2013-04-02 | < 0.19 | 700 | µg/L |
| Other Inorganics | 248353 | *HARDNESS, TOTAL (AS CAC03) | 2013-04-02 | 30 | 200 | mg/L |
| Other Organics | 248353 | HEPTACHLOR | 2013-04-02 | < 0.095 | 0.4 | µg/L |
| Other Organics | 248353 | HEPTACHLOR EPOXIDE | 2013-04-02 | < 0.095 | 0.2 | µg/L |
| Pesticides | 248353 | HEXACHLOROBENZENE | 2013-04-02 | < 0.095 | 1 | µg/L |
| Other Organics | 248353 | HEXACHLOROBUTADIENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Pesticides | 248353 | HEXACHLOROCYCLOPENTADIENE | 2013-04-02 | < 0.19 | 50 | µg/L |
| Metals | 248353 | *IRON | 2013-04-02 | < 0.1 | 0.3 | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Organics | 248353 | ALACHLOR (LASSO) | 2013-04-02 | < 0.19 | 2 | µg/L |
| Metals | 248353 | LEAD | 2013-04-02 | 0.0098 | 0.015 | mg/L |
| Metals | 248353 | MAGNESIUM | 2013-04-02 | 2.5 | Unregulated | mg/L |
| **Metals** | **248353** | ***MANGANESE** | **2013-04-02** | **0.10** | **0.05** | **mg/L** |
| Other Organics | 248353 | M-DICHLOROBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Metals | 248353 | MERCURY | 2013-04-02 | < 0.002 | 0.002 | mg/L |
| Other Organics | 248353 | METHOXYCHLOR | 2013-04-02 | < 0.19 | 40 | µg/L |
| Petroleum Hydrocarbons | 248353 | ***METHYL TERT-BUTYL ETHER (MTBE) | 2013-04-02 | < 0.5 | 10 | µg/L |
| Other Organics | 248353 | NAPHTHALENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | N-BUTYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| **Metals** | **248353** | ***NICKEL** | **2013-04-02** | **0.067** | **0.1** | **mg/L** |
| **Nutrients** | **248353** | **NITRATE** | **2013-04-02** | **5.9** | **10** | **mg/L** |
| Nutrients | 248353 | NITRITE | 2013-04-02 | < 0.01 | 1 | mg/L |
| Other Organics | 248353 | N-PROPYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | O-CHLOROTOLUENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | O-DICHLOROBENZENE | 2013-04-02 | < 0.5 | 600 | µg/L |
| Pesticides | 248353 | OXAMYL | 2013-04-02 | < 25 | 200 | µg/L |
| Petroleum Hydrocarbons | 248353 | O-XYLENE | 2013-04-02 | < 0.5 | See Total | µg/L |
| Other Organics | 248353 | P-CHLOROTOLUENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | P-DICHLOROBENZENE | 2013-04-02 | < 0.5 | 75 | µg/L |
| Other Organics | 248353 | PENTACHLOROPHENOL | 2013-04-02 | < 0.19 | 1 | µg/L |
| **Other Inorganics** | **248353** | ***pH** | **2013-04-02** | **5.6** | **6.5-8.6** | **Units** |
| Pesticides | 248353 | PICLORAM | 2013-04-02 | < 2 | 500 | µg/L |
| Other Organics | 248353 | P-ISOPROPYLTOLUENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Nutrients | 248353 | POTASSIUM | 2013-04-02 | 4.7 | Unregulated | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Organics | 248353 | SEC-BUTYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Metals | 248353 | SELENIUM | 2013-04-02 | < 0.01 | 0.05 | mg/L |
| Other Inorganics | 248353 | SILICA | 2013-04-02 | 7.9 | Unregulated | mg/L |
| Pesticides | 248353 | SIMAZINE | 2013-04-02 | < 0.19 | 4 | µg/L |
| Metals | 248353 | **SODIUM | 2013-04-02 | 8.4 | 20 | mg/L |
| Other Organics | 248353 | STYRENE | 2013-04-02 | < 0.5 | 100 | µg/L |
| Other Inorganics | 248353 | *SULFATE | 2013-04-02 | 5 | 250 | mg/L |
| Other Inorganics | 248353 | *TDS | 2013-04-02 | 96 | 500 | mg/L |
|  | 248353 | TEMPERATURE CENTIGRADE | 2013-04-02 | 15.5 | Unregulated | C |
| Other Organics | 248353 | TERT-BUTYLBENZENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | ***TETRACHLOROETHYLENE (PCE) | 2013-04-02 | < 0.5 | 1 | µg/L |
| Metals | 248353 | THALLIUM, TOTAL | 2013-04-02 | < 0.001 | 0.002 | mg/L |
| Petroleum Hydrocarbons | 248353 | TOLUENE | 2013-04-02 | < 0.5 | 1000 | µg/L |
| Pesticides | 248353 | TOXAPHENE | 2013-04-02 | < 0.49 | 3 | µg/L |
| Other Organics | 248353 | TRANS-1,2-DICHLOROETHYLENE | 2013-04-02 | < 0.5 | 100 | µg/L |
| Other Organics | 248353 | TRANS-1,3-DICHLOROPROPENE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | ***TRICHLOROETHYLENE (TCE) | 2013-04-02 | < 0.5 | 1 | µg/L |
| Other Organics | 248353 | TRICHLOROFLUOROMETHANE | 2013-04-02 | < 0.5 | Unregulated | µg/L |
| Other Organics | 248353 | TURBIDITY | 2013-04-02 | 1.3 | Unregulated | NTU |
| Metals | 248353 | URANIUM-234 | 2013-04-02 | < 0.0005 | 0.03 | mg/L |
| Other Organics | 248353 | ***VINYL CHLORIDE | 2013-04-02 | < 0.5 | 1 | µg/L |
| Petroleum Hydrocarbons | 248353 | XYLENE, META AND PARA | 2013-04-02 | < 1 | See Total | µg/L |
| Petroleum Hydrocarbons | 248353 | XYLENES, TOTAL | 2013-04-02 | < 1.5 | 10000 | µg/L |
| Metals | 248353 | *ZINC | 2013-04-02 | 0.09 | 5 | mg/L |
| Metals | 248353 | ANTIMONY TOTAL | 2013-06-24 | < 0.0005 | 0.006 | mg/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Metals | 248353 | ARSENIC | 2013-06-24 | < 0.0005 | 0.01 | mg/L |
| Metals | 248353 | BARIUM | 2013-06-24 | 0.2236 | 1 | mg/L |
| Metals | 248353 | BERYLLIUM, TOTAL | 2013-06-24 | 0.0006 | 0.004 | mg/L |
| Metals | 248353 | CADMIUM | 2013-06-24 | < 0.0005 | 0.005 | mg/L |
| Metals | 248353 | CHROMIUM | 2013-06-24 | 0.0007 | 0.1 | mg/L |
| Metals | 248353 | LEAD | 2013-06-24 | 0.0023 | 0.015 | mg/L |
| Metals | 248353 | *MANGANESE | 2013-06-24 | 0.0900 | 0.05 | mg/L |
| Metals | 248353 | MERCURY | 2013-06-24 | < 0.0005 | 0.002 | mg/L |
| Metals | 248353 | ***NICKEL | 2013-06-24 | 0.0058 | 0.1 | mg/L |
| Metals | 248353 | SELENIUM | 2013-06-24 | < 0.01 | 0.05 | mg/L |
| Metals | 248353 | THALLIUM, TOTAL | 2013-06-24 | < 0.0005 | 0.002 | mg/L |
| Metals | 248353 | URANIUM-238 | 2013-06-24 | < 0.0005 | 0.03 | mg/L |
| Metals | 248353 | *IRON | 2014-12-23 | < 0.025 | 0.3 | mg/L |
| Pathogens | 248353 | TOTAL COLIFORM | 2015-04-16 | A | A | CFU |
| Other Inorganics | 248353 | ALKALINITY TOTAL | 2015-06-23 | 34.2 | Unregulated | mg/L |
| Metals | 248353 | ANTIMONY TOTAL | 2015-06-23 | < 0.0005 | 0.006 | mg/L |
| Metals | 248353 | ARSENIC | 2015-06-23 | < 0.0005 | 0.01 | mg/L |
| Metals | 248353 | BARIUM | 2015-06-23 | 0.0983 | 1 | mg/L |
| Metals | 248353 | BERYLLIUM, TOTAL | 2015-06-23 | < 0.0005 | 0.004 | mg/L |
| Metals | 248353 | CADMIUM | 2015-06-23 | < 0.0005 | 0.005 | mg/L |
| Other Inorganics | 248353 | *CHLORIDE | 2015-06-23 | 10.4 | 250 | mg/L |
| Metals | 248353 | CHROMIUM | 2015-06-23 | 0.0010 | 0.1 | mg/L |
| Metals | 248353 | COPPER FREE | 2015-06-23 | 0.0027 | 1 | mg/L |
| Other Inorganics | 248353 | ***FLUORIDE | 2015-06-23 | < 0.1 | 2 | mg/L |
| Radionuclides | 248353 | GROSS ALPHA PARTICLE ACTIVITY | 2015-06-23 | 1.08+/- 0.833 | 15 | pCi/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Inorganics | 248353 | *HARDNESS, TOTAL (AS CAC03) | 2015-06-23 | 45.4 | 200 | mg/L |
| Metals | 248353 | *IRON | 2015-06-23 | < 0.1 | 0.3 | mg/L |
| Metals | 248353 | LEAD | 2015-06-23 | < 0.0005 | 0.015 | mg/L |
| Metals | 248353 | *MANGANESE | 2015-06-23 | 0.0172 | 0.05 | mg/L |
| Metals | 248353 | MERCURY | 2015-06-23 | < 0.0005 | 0.002 | mg/L |
| Metals | 248353 | ***NICKEL | 2015-06-23 | 0.0012 | 0.1 | mg/L |
| Nutrients | 248353 | NITRATE | 2015-06-23 | 3.9 | 10 | mg/L |
| Nutrients | 248353 | NITRITE | 2015-06-23 | < 0.1 | 1 | mg/L |
| **Radionuclides** | **248353** | **RADIUM-226** | **2015-06-23** | **0.840 +/- 0.437** | **0** | **pCi/L** |
| **Radionuclides** | **248353** | **RADIUM-228** | **2015-06-23** | **0.980 +/- 0.423** | **0** | **pCi/L** |
| Metals | 248353 | SELENIUM | 2015-06-23 | < 0.01 | 0.05 | mg/L |
| Metals | 248353 | **SODIUM | 2015-06-23 | 7.3 | 20 | mg/L |
| Other Inorganics | 248353 | *SULFATE | 2015-06-23 | 14.0 | 250 | mg/L |
| Other Inorganics | 248353 | *TDS | 2015-06-23 | 108 | 500 | mg/L |
| Metals | 248353 | THALLIUM, TOTAL | 2015-06-23 | < 0.0005 | 0.002 | mg/L |
| Pathogens | 248353 | TOTAL COLIFORM | 2015-06-23 | A | A | CFU |
| Other Organics | 248353 | TURBIDITY | 2015-06-23 | 0.35 | Unregulated | NTU |
| Metals | 248353 | URANIUM-238 | 2015-06-23 | < 0.0005 | 0.03 | mg/L |
| Metals | 248353 | CHROMIUM | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 248353 | CHROMIUM DISSOLVED | 2018-01-22 | 1.3 | 100 | µg/L |
| Metals | 248353 | CHROMIUM VI | 2018-01-22 | 2.7 | 100 | µg/L |
| Other Organics | 248353 | N-ETHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NETFOSAA) | 2018-01-22 | 1.68 | Unregulated | ng/L |
| Other Organics | 248353 | N-METHYL PERFLUOROOCTANE SULFONAMIDOACETIC ACID (NMEFOSAA) | 2018-01-22 | 2.75 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROBUTANESULFONIC ACID (PFBS) | 2018-01-22 | 8.24 | Unregulated | ng/L |

| Contaminant Class | DNREC ID | Contaminant | Sample Date | Result | Standard | Units |
|---|---|---|---|---|---|---|
| Other Organics | 248353 | PERFLUORODECANOIC ACID (PFDA) | 2018-01-22 | 0.61 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUORODODECANOIC ACID (PFDOA) | 2018-01-22 | 0.49 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROHEPTANOIC ACID (PFHPA) | 2018-01-22 | 5.82 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROHEXANESULFONIC ACID (PFHXS) | 2018-01-22 | 25.8 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROHEXANOIC ACID (PFHXA) | 2018-01-22 | 11.7 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUORONONANOIC ACID (PFNA) | 2018-01-22 | 32.2 | Unregulated | ng/L |
| **Other Organics** | **248353** | **PERFLUOROOCTANESULFONIC ACID (PFOS)** | **2018-01-22** | **172** | **Unregulated** | **ng/L** |
| Other Organics | 248353 | PERFLUOROOCTANOIC ACID (PFOA) | 2018-01-22 | 15.1 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROTETRADECANOIC ACID (PFTEA) | 2018-01-22 | 0.26 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROTRIDECANOIC ACID (PFTRIA) | 2018-01-22 | 1.15 | Unregulated | ng/L |
| Other Organics | 248353 | PERFLUOROUNDECANOIC ACID (PFUNA) | 2018-01-22 | 0.97 | Unregulated | ng/L |

# Appendix D. Data Sources

## Table 14. Data Sources Used in Source Water Assessments

The data used in the Source Water Assessments is provided by many State Agencies. For more information regarding each program, you may contact them directly.

| Type | Organization | Section | Phone Number |
|---|---|---|---|
| Public Water Supply Well Data | Department of Natural Resources and Environmental Control | Water Supply Section | (302) 739-9945 |
| Public Water Supply Well Data | Delaware Geological Survey | | (302) 831-2833 |
| Water Quality Data | Department of Health and Social Services | Division of Public Health Office of Drinking Water | (302) 741-8630 |
| Land Use / Land Cover GIS Coverage | Delaware Office of State Planning Coordination | | (302) 739-3090 |
| Animal Feedlot Operations | County Conservation Districts | Kent | (302) 697-2600 |
| Animal Feedlot Operations | County Conservation Districts | New Castle | (302) 832-3100 |
| Animal Feedlot Operations | County Conservation Districts | Sussex | (302) 856-3990 |
| Combined Sewer Overflows (CSOs) | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-9946 |
| Dredge Spoil Disposal Areas | Department of Natural Resources and Environmental Control | Soil and Water Conservation | (302) 739-9921 |
| Hazardous Waste Generator Sites | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-9403 |
| Landfills and Dumps | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-9403 |
| Large On-site Septic Systems | Department of Natural Resources and Environmental Control | Ground Water Discharges Section | (302) 739-9948 |
| NPDES Wastewater Outfalls | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-9946 |
| Pesticide Loading, Mixing, and Storage Facilities | Delaware Department of Agriculture | Pesticide Management Section | (302) 739-4811 |
| Salvage Yards | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-9403 |
| Site Investigation and Restoration Branch (SIRB) [Superfund] Sites | Department of Natural Resources and Environmental Control | Site Investigation and Restoration Branch | (302) 395-2600 |
| Sludge Application Sites | Department of Natural Resources and Environmental Control | Surface Water Discharges Section | (302) 739-9946 |
| Spray Irrigation Sites | Department of Natural Resources and Environmental Control | Ground Water Discharges Section | (302) 739-9948 |
| Tire Piles | Department of Natural Resources and Environmental Control | Solid and Hazardous Waste Management Branch | (302) 739-9403 |
| Toxic Release Inventory Sites | Department of Natural Resources and Environmental Control | Air Quality Management Section | (302) 739-9402 |
| Underground Storage Tanks | Department of Natural Resources and Environmental Control | Underground Storage Tank Branch | (302) 395-2500 |

# Appendix E. Historical Wells

## Table 15. Historical Record of All Wells Associated with Facility.

| DNREC ID | Well Type | Local ID | Permit Issued | Year Constructed | Year Abandoned | Well Capacity (gpm) | Diameter (inches) | Screen Interval (fbgs) |
|---|---|---|---|---|---|---|---|---|
| **242434** | Test | - | - | 2013 | - | 150 | 6 | 65-95 |
| **246039** | Public | - | Voided | - | - | - | - | - |
| **242494** | MW | MW-1 | - | 2013 | 2015 | - | 2 | 70-100 |